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GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LIMITED

PROGRESS REPORT ON E.L. 10/74

BLACK BLUFF

TASMANIA

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APRIL 1979 to DECEMBER 1979

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W. HERRMANN

DEVONPORT.

JULY, 1980.

CONTENTS

1. INTRODUCTION
2. SUMMARY
3. RECOMMENDATION
4. ACTION SHEET
5. BACKGROUND
6. MARINER 3 - MARINER 5 AREA
 - 6.1 Geochemistry
 - 6.2 Geophysics
 - 6.3 Percussion Drilling
 - 6.4 Discussion
7. MARINER 4 AREA
8. REFERENCES

PLANS

- Mariner 1,3,5, Geomagnetic Total Force Contours 1:5000
- Mariner 3 and 5, Geomagnetic Total Force Profiles 1:5000

FIGURES

- Fig 1. Locality Map E.L. 10/74 1:5000
- Fig 2. Mariner 1-3, Soil Geochem Zonation and Geology 1:5000
- Fig 3. Mariner 1, Zones A,B and C.
- Fig 4. Mariner 3, Panned Concentrate Results Sn, W, Au 1:10000
- Fig 5. Mariner 3, Drainage Geochem; Cu, Pb,Zn -80fraction 1:10000

- 002
- Fig 6. Mariner 3, Drainage Geochem; Sn, W, -80 fraction 1:10000
- Fig 7. Mariner 5, "window" Soil Geochem, Cu, Pb, Zn 1:2500
- Fig 8. Mariner 5, "window" Soil Geochem, Bi, Sn, W. 1:2500
- Fig 9. Mariner 4 Area. Geology and Stream Sediment
Geochem. 1:10000

1.

INTRODUCTION

Exploration Licence 10/74 known as Black Bluff, by Geopeko and Union Oil Development Corporation and occupies an area of 150 sq km in North Western Tasmania. (Ref: Fig 1.)

The results of Geopeko's work at Black Bluff upto February 1977, and a summary of previous work in the area by Pickands Mather (1968), Tasminex N.L. (1973/74) and Union Oil Corp. (1974/75) are presented in the progress report by R. Van den Bogaart and G.L. Buckland, dated April 1978. Exploration upto April 1979 was reviewed in two Memoranda's covering the Mariner 1 and Mariner 3. prospects by G.L. Buckland.

This report summarizes the details of exploration carried out, mainly in the Mariner 3 area, upto December 1979.

2.

SUMMARY

A zonal distribution of geochemically anomalous copper, lead, zinc and tin has been recognized in soils and stream sediments in the Mariner 1,3,5 area in the southeastern part of E.L. 10/74. The zonal arrangement of lead, lead-zinc, zinc, copper-tin anomalies from west to east along the grid appears to fit the concentric metal zonation to be expected around a vein type tin deposit.

Indications are that such a tin deposit could exist beneath basalt cover at the eastern end of the grid.

Ground magnetic survey, soil geochemical sampling and exploratory percussion drilling techniques have been applied in so far unsuccessful attempts to detect the postulated tin source beneath the basalt.

The recognition of high grade thermally metamorphosed rocks at Mariner 4, near the Lea River in the eastern part of E.L. 10/74, suggests the presence of a shallow seated (granitic) intrusive which may have potential for tin-tungsten mineralization.

3.

RECOMMENDATIONSMariner 1, 3 and 5.

It is recommended that electrical resistivity "soundings" be conducted at several locations on the basalt at the eastern end of the grid in order to determine:

- a) the depth of the basalt cover
- b) the suitability of Induced polarization as a technique for detecting sulphide associated tin-vein mineralization beneath the basalt.

If it appears that I.P. can be successfully applied, systematic I.P. survey should be carried out over the eastern extensions and any confident targets emerging should be tested by percussion/diamond drilling.

If I.P. cannot be used to provide drilling targets it is recommended that no further work be carried out on the prospect.

Mariner 4.

Careful geological reconnaissance, -80 fraction and panned concentrate sampling of stream sediments should be carried out in the Mariner 4 area. Particular attention should be given to detection of tin and tungsten mineralization.

5.

BACKGROUND

- Initial work by Geopeko in E.L. 10/74 involved:
- a) geological mapping and stream sediment sampling on a regional basis.
 - b) detailed mapping, soil geochemical sampling and geophysical surveying on two prospects, between the Iris and Fall Rivers, as follow up on previous work by Union Oil Corp. The prospects were named Mariner 1 and Mariner 2; Mariner 3 evolved out of the north-eastern extension of the Mariner 1 grid.

Mapping in the Mariner 3 area indicated the principal rock type was medium-coarse grained quartz-feldspar-biotite porphyry of approximately dacitic composition and interpreted to be an intrusive body associated with Cambrian acid vulcanism.

Soil geochemistry defined several Cu-Zn anomalies with related "spot highs" in Ag, Bi, As and Sn. Geophysical surveys indicated a strong (-180mV) S.P. anomaly with coincident V.L.F.-Electromagnetic and Induced Polarization anomalies. (Mudge, 1978 .) Two costeans were excavated over the geophysical anomalies and it was found that mineralization was restricted to rather sparse, narrow, irregular quartz-pyrite-chalcopyrite veins cutting the porphyry. Bedrock grab samples from the costeans were found to be moderately anomalous with peak Cu, Pb, Zn and Sn values correlating with zones of veinlet mineralization. The veinlets appeared to be associated with zones of locally intense clay-sericite alteration, of feldspars within the host rock (Buckland, 1979,b.).

Similar results were achieved at Mariner 1. (Buckland, 1979, a). However it was considered that these results did not adequately explain the high magnitude S.P. - I.P. anomalies at Mariner 3.

Consequently, a diamond drill hole of 137.5 metres depth, was drilled to further test the S.P. target.

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The hole intersected quartz-feldspar-biotite porphyry with sparsely distributed quartz-(muscovite)-pyrite-minor chalcopyrite veinlets and local alteration essentially similar to that exposed in the costeans.

Nevertheless, it was concluded that the soil geochem and geophysical anomalies must be attributable to a (presumably local) "high frequency distribution" of sulphide bearing veinlets.

It was suggested that the mineralization, alteration and geochemical pattern represented "epithermal" vein mineralization "probably emanating from a shallow seated Upper Devonian granitic stock.

The regional drainage geochem survey of E.L. 10/74 is 1977 had shown that two tributaries of the Iris River, draining the eastern edge of the Mariner 1-3 grid were anomalous in tin.

The prospect work and drilling on the grid had indicated only minor traces of tin associated with the pyritic veinlets at Mariner 3 and in cassiterite bearing chloritic greisen vein in Costean 1 at Mariner 1 and it was considered that these did not adequately account for the drainage geochem anomalies.

Subsequent exploration in 1979, in the Mariner 3 area was directed toward discovering the source of the tin.

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6.MARINER 3 - MARINER 5 AREA

Reassessment of the accumulated data during July 1979, led to the recognition of a zonal distribution of soil geochemical anomalies over the Mariner 1-3 grid area.

A zonal arrangement of Cu, Zn, Zn-Pb, Pb is evident progressing from east to west along the grid (Refer to Fig 2.).

The strongest anomalous tin in stream sediments occurs in the stream draining the eastern edge of the copper soil anomaly.

This distribution appears to fit the metal zonation typical of vein type tin mineralization and suggests the presence of such mineralization situated under the Tertiary basalt cover to the north-east of the Mariner 3 grid.

The original -80 mesh stream sediment geochem data in part supports this concept as recognized by Van den Bogaart and Buckland, 1978. (Refer to Fig 3.)

6.1 Geochemistry

In order to confirm the zonation and to define the area of greatest tin potential additional stream sediment and panned concentrate sampling was carried out in the streams draining the Mariner 3 area. Panned concentrates and -80 mesh fractions of sediments were sampled at twenty seven localities.

Panned concentrates were analysed for Au, Sn, W and -80 mesh fractions for Cu, Pb, Zn, Sn, W. (Sn, W analyses by X.R.F.)

Analytical results are shown on Figures 4,5 and 6.

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Results for panned concentrate samples ranged upto 3.55% Sn, 430ppm W, 18.5ppm Au and for -80 mesh fractions upto 235ppm Sn, 210ppm Cu, 900ppm Pb and 450ppm Zn and more or less confirmed the original results.

Sediments from several small, previously unsampled streams from the far eastern part of the area were found to contain only background concentrations of Sn and W, probably due to the fact that these streams have not eroded below the base of the basalt cover.

A panned concentrate sample of gravel overlying a small area of altered quartz-feldspar-biotite porphyry, representing a "window" in the basalt cover east of the Mariner 3 grid, was found to contain 1.02% Sn and 1.7gm/t Au. The porphyry in this locality is strongly altered, in places carries fine boxworks after disseminated pyrite and is associated with gossanous quartz vein float and it seemed likely that the tin in the surface gravels was directly derived from the underlying rock.

In order to test this possible source, it was proposed that C-Horizon soil sampling should be carried out over the "window" which lies about 700m. east of the Mariner 3 "copper zone" and therefore favourably closer to the postulated zone of tin mineralization,

The Mariner 3 grid was extended eastward to 11900E and southward to the Iris River; these extensions were then entitled "Mariner 5".

C-Horizon and in some cases also B-Horizon soils were collected at thirty seven localities at depths varying from 0.5 to about 15 metres using a Bombardier mounted Jacro auger drill.

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Logging of rock chips collected from the bottom of the holes enabled definition of the extent of the porphyry window as shown on Figure 2. It is possible that the "window" extends westward to link up with the main exposure of porphyry at Mariner 3 but this is uncertain as there is little outcrop and auger drilling was not conducted on lines 11300 and 11400E.

Soil samples collected over the "window" area were dried and pulverized and "entire" splits were analysed for Cu, Pb, Zn, Ag, Bi by A.A.S. and for Sn, W by X.R.F. techniques.

Results were generally disappointing; tin values peaked at 105ppm Sn but were mostly below detection (5ppm) and tungsten values were uniformly below detection (10ppm). Copper, lead and zinc results ranged upto 70, 300 and 200ppm respectively; these values are not anomalous by comparison to those formed on the main Mariner 1-3 grid and apart from a slight sympathy between lead and tin show no particular correlations.

Results are shown on Figures 7 and 8 at 1:2500 scale.

Comparison of tin values in B-Horizon and C-Horizon samples at the same locality generally shows the higher value (if any) is in the C-Horizon of soil suggesting the altered porphyry in the window may be the true source of tin. However the few anomalous values are very sparsely distributed and do not compare with the 1.02% tin panned from the overlying surface gravels and it is considered that the latter high value is due to residual or fluvial concentration mechanisms.

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An attempt was made to "profile" the tin values with respect to sample depth. An auger hole near the centre of the prophyry "window" at 11600E, 8925N; was drilled to a depth of 10.0 metres and soils sampled at 1.0 metre intervals. Unfortunatley, tin values were all below 5ppm and so no useful result was achieved. A panned concentrate sample of the upper 2.5 metres (B-Horizon clays) from the same hole also returned less than 5ppm Sn.

6.2 Geophysics

Magnetics

Despite the relatively poor encouragement from the geochemical sampling over the Mariner 5 "window" it was considered that further search for the postulated tin source was warranted.

Accordingly, ground magnetic survey was carried out over the Mariner 5 grid extensions in order to identify possible additional "windows" or areas of thin basalt cover. The basalt typically shows a very "noisy" magnetic character which can be distinguished from areas of porphyry having a relatively "flat" magnetic response.

Magnetic contours and profiles are shown on plan numbers 3327 and 3600 S/A.

Interpretation of the magnetic data (Mudge, September, 1979) suggested several areas which might correspond to windows or patches of thin basalt, as shown by coloured shading on the magnetic contour plan.

On the basis of the magnetic interpretation, Jacro-auger holes were drilled on grid co-ordinates: 11300E/9825N, 11500E/9900N, 11500E/9925N, 11500E/9950N, 11600E/9850N, 11600E/9750N, 11600E/9600N, 11700E/9700N. Hard basalt, which the auger drill could not penetrate, was encountered in each of these holes, at depths varying from 0.7 to 6.5 metres.

It was concluded from this exercise that the basalt cover was more or less continuous north of the already known exposures of underlying porphyry and that further exploration for the tin source would depend on some geophysical survey or drilling technique which was capable of penetrating the basalt cover. It was considered that Induced Polarization survey could give meaningful results in areas covered by upto 25 metres of basalt.

Self Potential

Several short reconnaissance S.P. traverses were measured on lines 11300E, 11500E and 11600E from about 8700N to 9400N (thus covering the Mariner 5 "window") but no significant self potential effects were encountered.

6.3 Percussion Drilling.

In order to gain an estimate of the thickness of the basalt cover, from which the suitability of an I.P. survey could be assessed, a short percussion drilling program was proposed. By drilling through the basalt it would be possible to sample any sub-basaltic gravels or "deep lead" alluvials which, if present, could be a source for the stream tin anomalies and in addition core samples from the underlying quartz-feldspar-biotite porphyry could be obtained for analysis.

Accordingly, a vertical percussion drill hole (PCH 1) was collared at grid co-ordinates 11220E/9990N. A Halco 2 3/4", down hole percussion hammer was used in conjunction with the Bombardier Mounted Jacro rig and a 250 cfm. compressor providing air at about 100 psi. Rate of penetration in fresh basalt was very poor, approximately 1 metre-1.5 metres per hour due to rock hardness and recurrent stalling of the hammer, due evidently to excessive water inflow (estimated at about 500l/hour.) The hole was abandoned at 14.0m and the rig was then moved to 11270E/9725N and drilling recommenced. PCH-2 progressed at similar poor rate to PCH-1 and was eventually abandoned at 10.3 meters.

Due to the unavailability of more suitable drilling equipment, the percussion drilling program, having achieved no useful results, was terminated.

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6.4 Discussion

Efforts to determine the source of the stream tin anomalies have been severely hampered by the basaltic cover over much of the eastern Mariner 3-5 grid area and to date have been inconclusive.

Three alternative sources of tin are considered possible in this area:

1. The tin in the streams is derived from reworking of tin bearing sub-basaltic gravels which may have been transported from a quite remote primary source.
2. The stream anomalies reflect alluvial concentration of tin minerals eroded from the low grade-low intensity quartz-pyrite veinlet mineralization occurring within the exposed body of quartz-feldspar-biotite prophyry.
(Buckland reports upto 750ppm Sn in selected quartz-sulphide vein samples from M3-D.D.H. 1.)
3. The stream tin is derived from erosion of a high grade tin source, most likely of epigenetic vein mineralization related to a subsurface (Devonian) granitic intrusion, located at the eastern end of the grid and probably partly buried under basalt.

The first alternative is not well favoured since drainage tin anomalies are not known elsewhere in the area and the coincidence of the Cu-Zn-Pb anomalies in zonal arrangement suggest a local source.

In the second case it would be unlikely that an economic tin resource could be developed from such a low grade and low intensity mineralized veinlet system.

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The third case is the most economically attractive. It is possible that tin (eroded from a non substantially covered high grade source) was locally redistributed in pre-basaltic eluvial/alluvial gravels which are now exposed in such areas as the Mariner 5 "window" giving use to the observed stream anomalies.

However, the findability of such a source is poor due to basalt cover which from the percussion drilling exercise is known to be upto at least 14 metres thick. A Schlumberger array resistivity sounding by Mudge (1978) indicated the basalt cover had a low resistivity and he concluded that I.P. survey could not effectively "see through" the basalt. However, a dipole-dipole I.P. survey on line 11500E indicated a weakly polarizable source possibly below the basalt at 9550N.

Induced Polarization survey is probably the last hope for detecting a mineralized zone beneath the basalt, short of random drilling.

It is recommended that further resistivity soundings should be conducted at several additional points over the basalt, say at 9600N on lines 11500E, 11700E and 11900E. Further I.P. work over the basalt is not advised unless it can be concluded from the sounding data that an I.P. survey would effectively detect polarizable sources, (with which the supposed tin mineralization would be presumably associated) beneath the basalt.

If I.P. cannot be successfully applied to define drilling targets beneath the basalt, it is recommended that no further work be carried out on the prospect.

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7. MARINER 4 AREA

A brief geological reconnaissance was made of the north eastern end of the Bond Range to investigate siliceous alteration zones reported by E. Corbett (1975) in the area of an old copper prospect located in a small tributary of the Lea River. (Refer Fig. 9.)

The siliceous "spines" mapped by Corbett were found to be thermally metamorphosed quartz porphyry or tuff containing upto 25% corundum and minor patches of andalusite.

The discovery of these high grade metamorphic rocks suggests the presence of an intrusive body at shallow depth in this area.

If the intrusive is granitic, (there are some indications that the Late Devonian Dalcoath extends westwards under Moina and beyond to the Lea River) this area has potential for tin-tungsten mineralization.

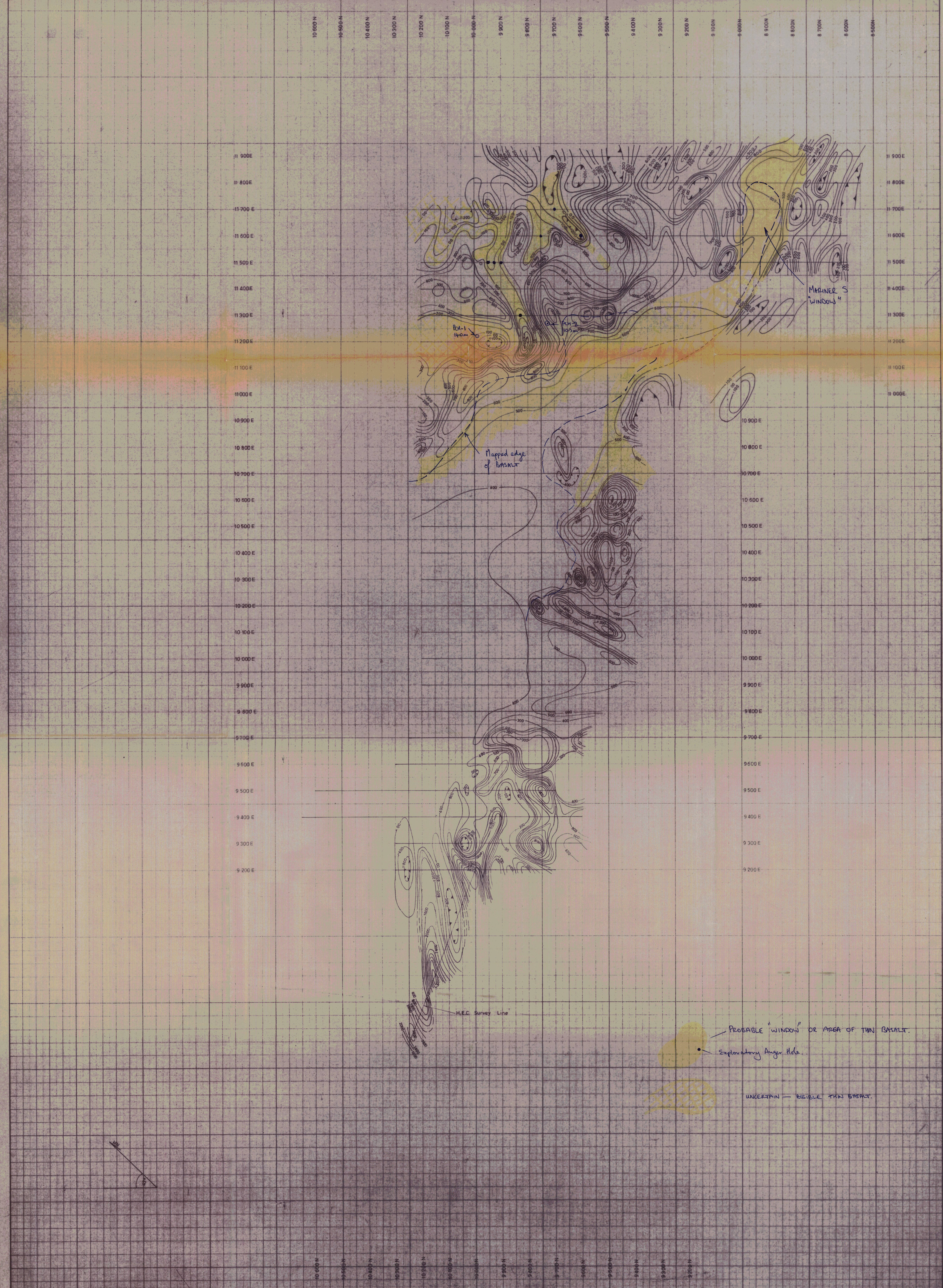
Copper-lead-zinc drainage geochem anomalies occur in the immediate vicinity.

The nearby Kauri Fault may be an early structure and may have been important as a hydrothermal channel.

Further geological reconnaissance, -80 fraction and panned concentrate stream sediment sampling is planned.

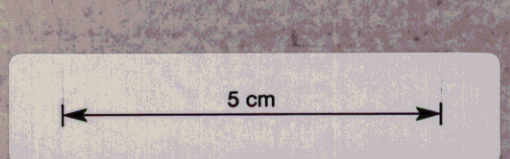
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Geopeko Limited. (Tasmania)
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Bond Range Area. NORTH TASMANIA.
E.L. 10/74 Black Bluff.
(for Union Oil Devel. Corp.)
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Mariner 1 and 3
Black Bluff, TASMANIA.
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(Internal memo to R.R. Large.)
- VAN DEN BOGAART, R. and
BUCKLAND, G.L., 1978. Progress Report on E.L. 10/74
Black Bluff Area - Tasmania.

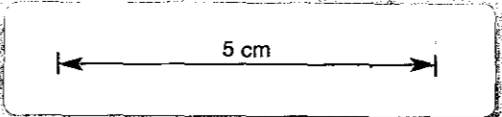
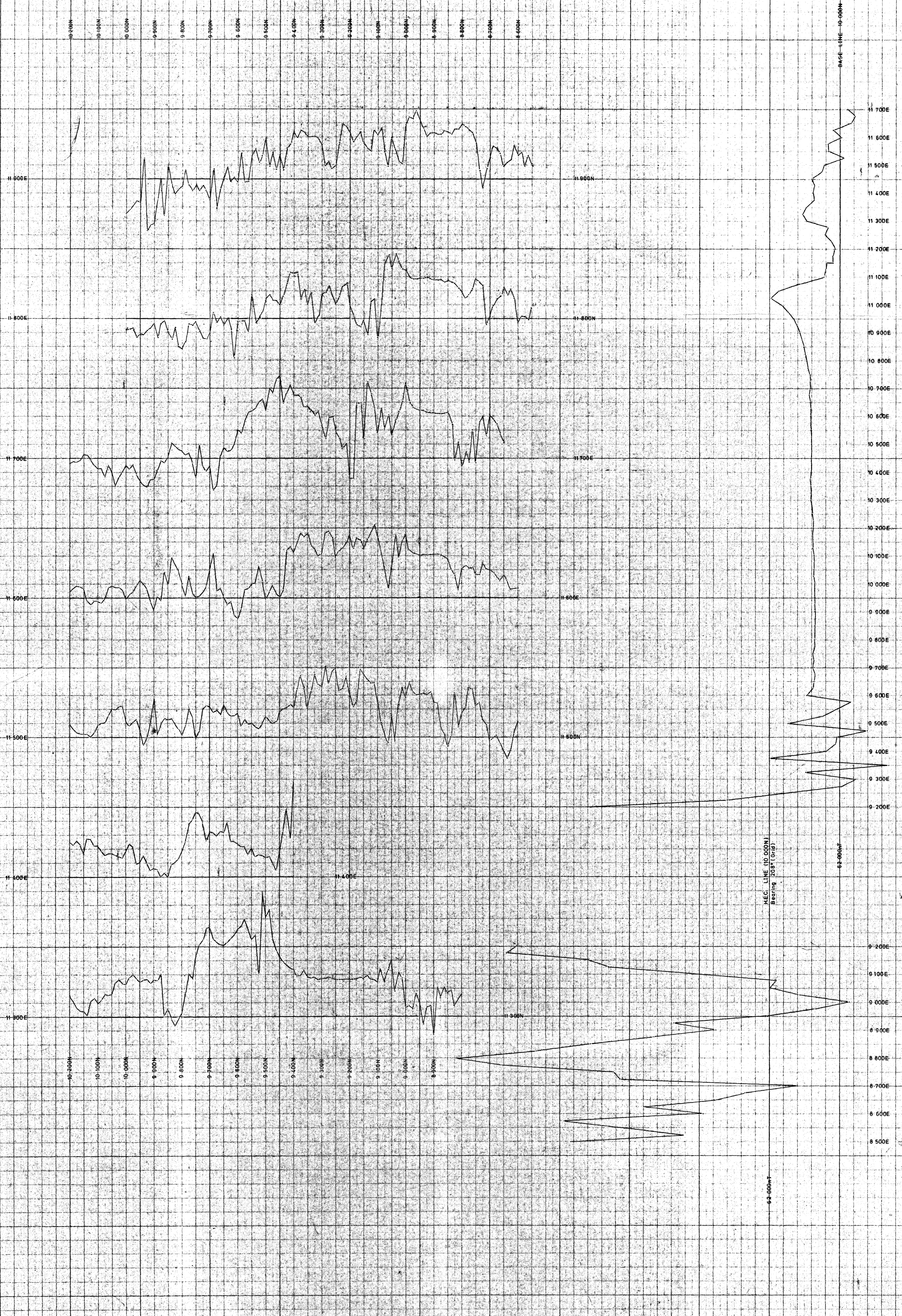


GEOPEKO LTD.
Geophysical Surveys.
Plan No. 3327

Amended September 1979



Instrument	Geometrics 815	Datum	62 000 nT	Hor. Scale	1 cm = 50 metres	AREA	Black Bluff EL10/74	1163
Observer	S. Mudge & I. Ogilvie	Base Mag	9 800 E / 10 000 N	Vert. Scale		PROSPECT.	MARINER 1,3 & 5	003019
Scale Fact.		Date	December 1977	Cont Int	100 nT & 400 nT	PLAN SHOWS.	Geomagnetic Total Force Contours.	

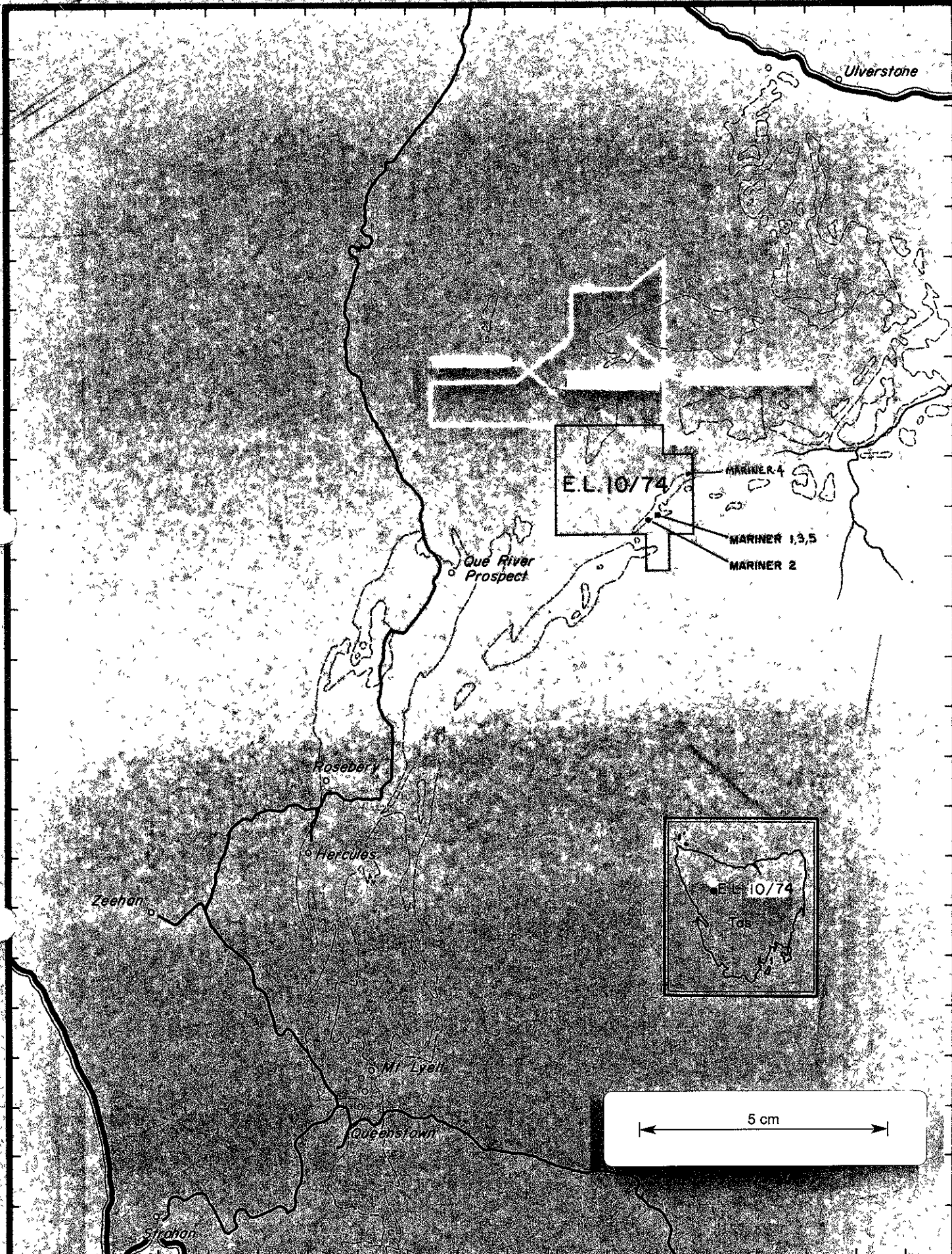


Instrument	Geometrics 816	Datum	62 000 nT	Hor. Scale	1cm = 50metres	AREA	Black Bluff EL10/74	1164
Observer	S. Mudge I. Ogilvie	Base Peg	9 800E/10 000N	Vert. Scale	200nT	PROSPECT.	MARINER 3&5	003020
Scale Fact.		Date	December 1977	Cont. Int.		PLAN SHOWS:	Geomagnetic Total Force Profiles	Sheet 3



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LEGEND

- Significant Basemetal Mineralization
-  Mt. Read Acid Volcanics
-  Mt. Read Volcanics/Sediments



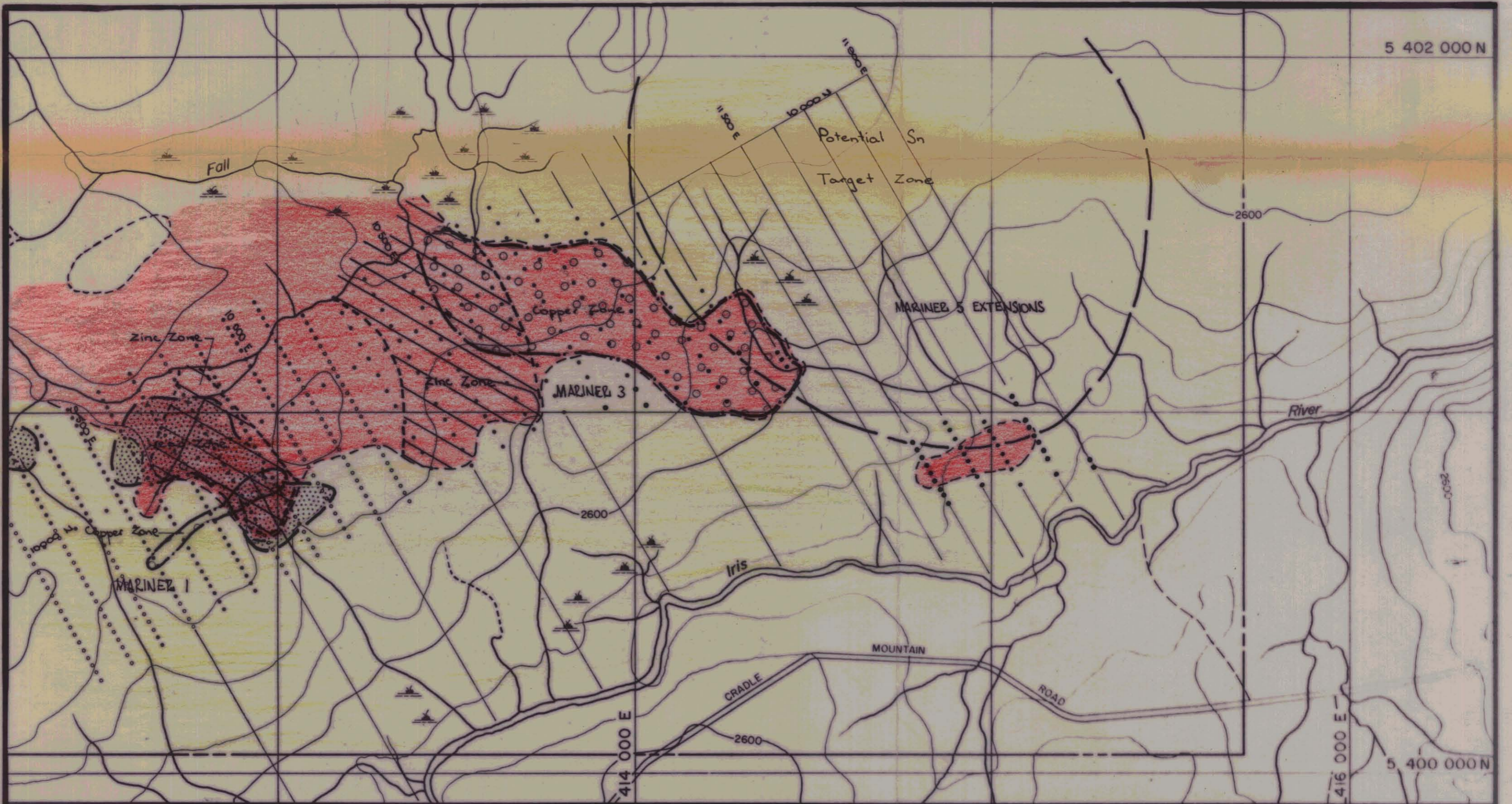
DATE Mar 78
 GEOL G.L.B.
 DWN J.P.M.
 CHKD M.C.R.

GEOPEKO LIMITED
 KING ISLAND




Scale: 1: 500 000

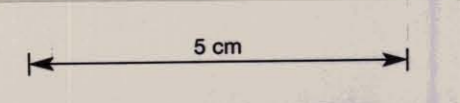
Fig. No. 1

Location Map
 E.L. 10/74


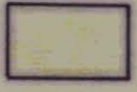


SOIL GEOCHEMICAL ZONES

- Cu 
- Pb 
- Zn 



GEOLOGICAL LEGEND

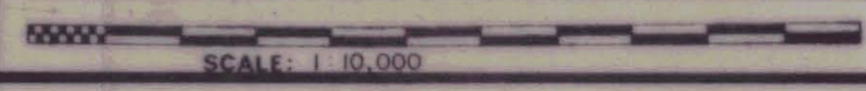
- 19-20  Qtz-feldspar-biotite porphyry with local clay-ser-chl alteration.
- 19-48  Tertiary Basalt Cover



DATE: NOV. 1980
 GEOLOGIST: P.R.L.
 DRAWN: D. GREEN
 CHECKED:

GEOPEKO LIMITED

003022



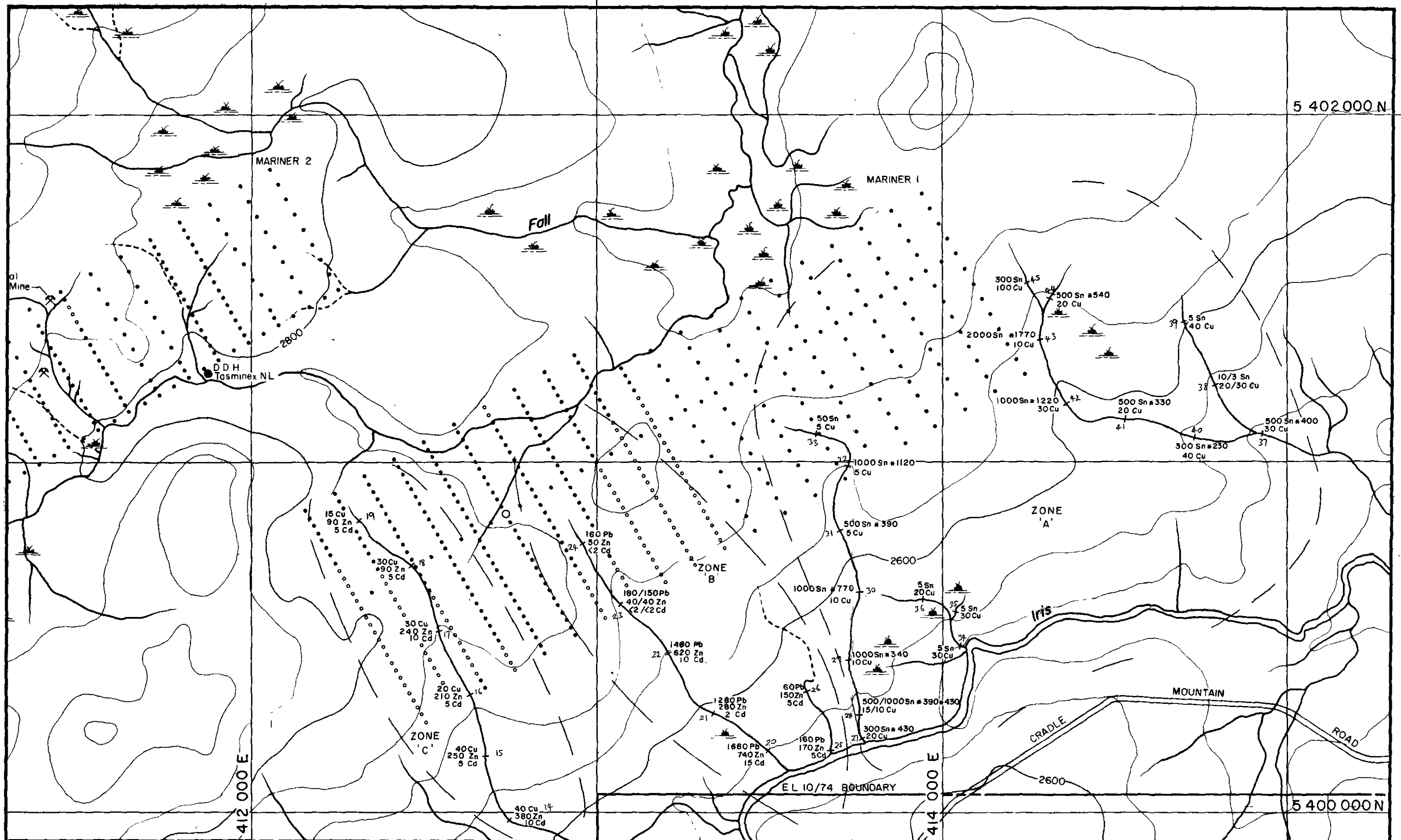
No. TS 10/74-3

E.L. 10/74
 BLACK BLUFF, TASMANIA
 MARINER 1-3, Soil Geochemical
 Zonation and Geology.

FIG. 2

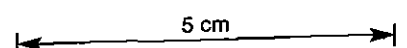
KT10/74-1	
KT10/74-2	KT10/74-3

1158



LEGEND

ANALYTICAL METHODS - Stream sediment samples
 Cu, Pb, Zn, Cd by AAS following HCl leach
 and HCl/HNO₃ leach in latter stages of
 0.25g sample
 Sn determined by - Emission Spectrography
 - * XRF
 Results in ppm



DATE APRIL '78
 GEOLOGIST G L B
 DRAWN J P M
 CHECKED M C R

GEOPEKO LIMITED
 KING ISLAND GROUP

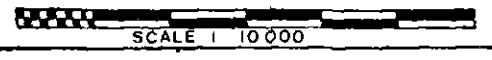


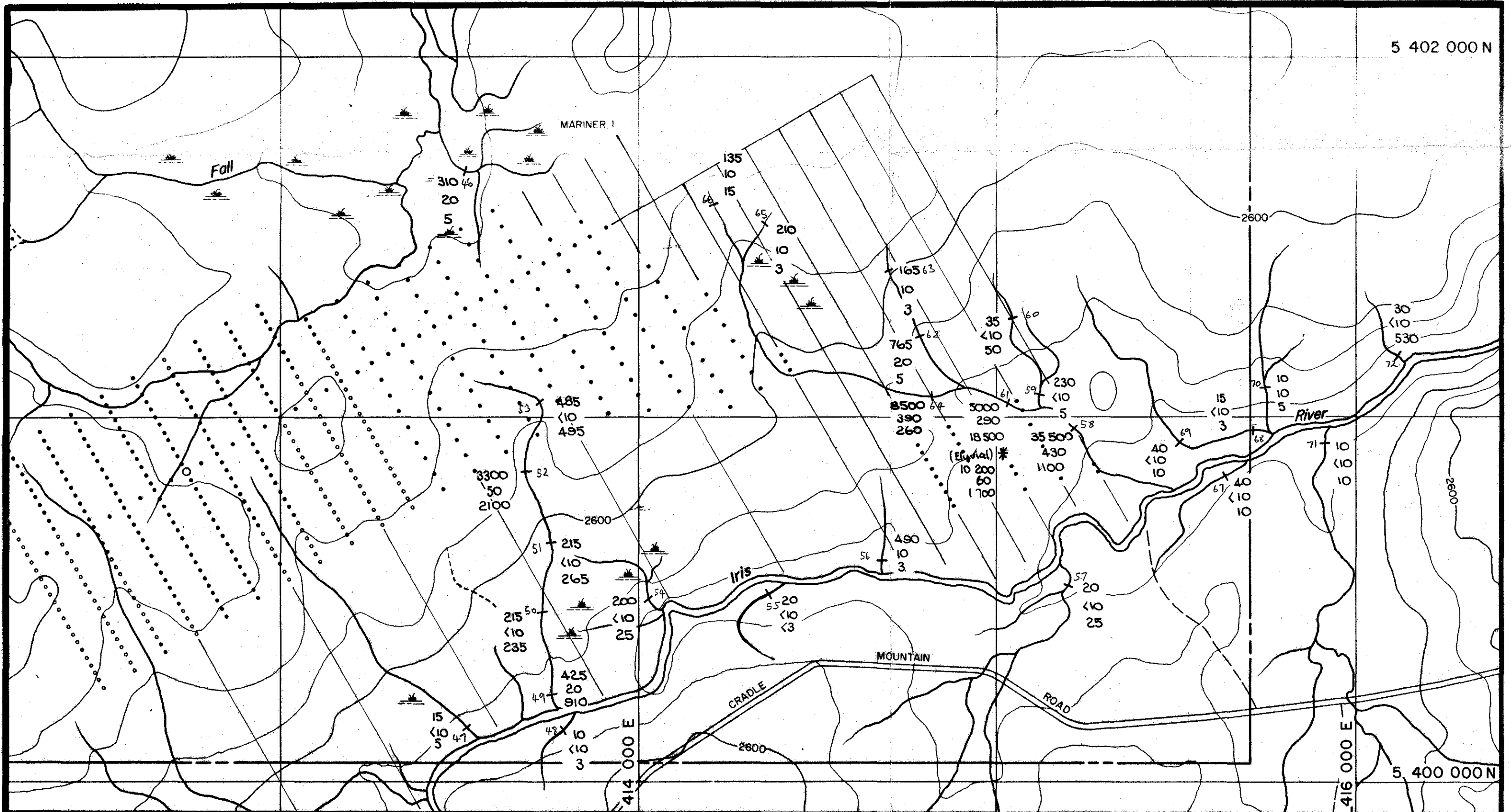
FIG. 3

EL.10/74 BLACK BLUFF, TASMANIA

MARINER I ZONES A, B and C

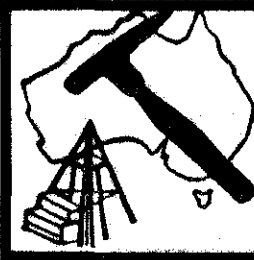
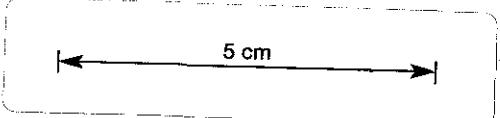
003023 1159

81-1523



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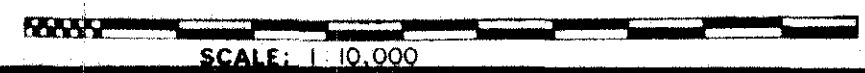
Sn - ppm
 W - ppm
 Au - ppb



DATE: NOV. 1980
 GEOLOGIST: R.R.L.
 DRAWN: D. GREEN.
 CHECKED:

GEOPEKO LIMITED
 Devonport Base, Tasmania

003024



No.TS 10/74-3

E.L. 10/74
 BLACK BLUFF, TASMANIA
 MARINER 3 Panned Concentrate
 Results
 Sn, W, Au

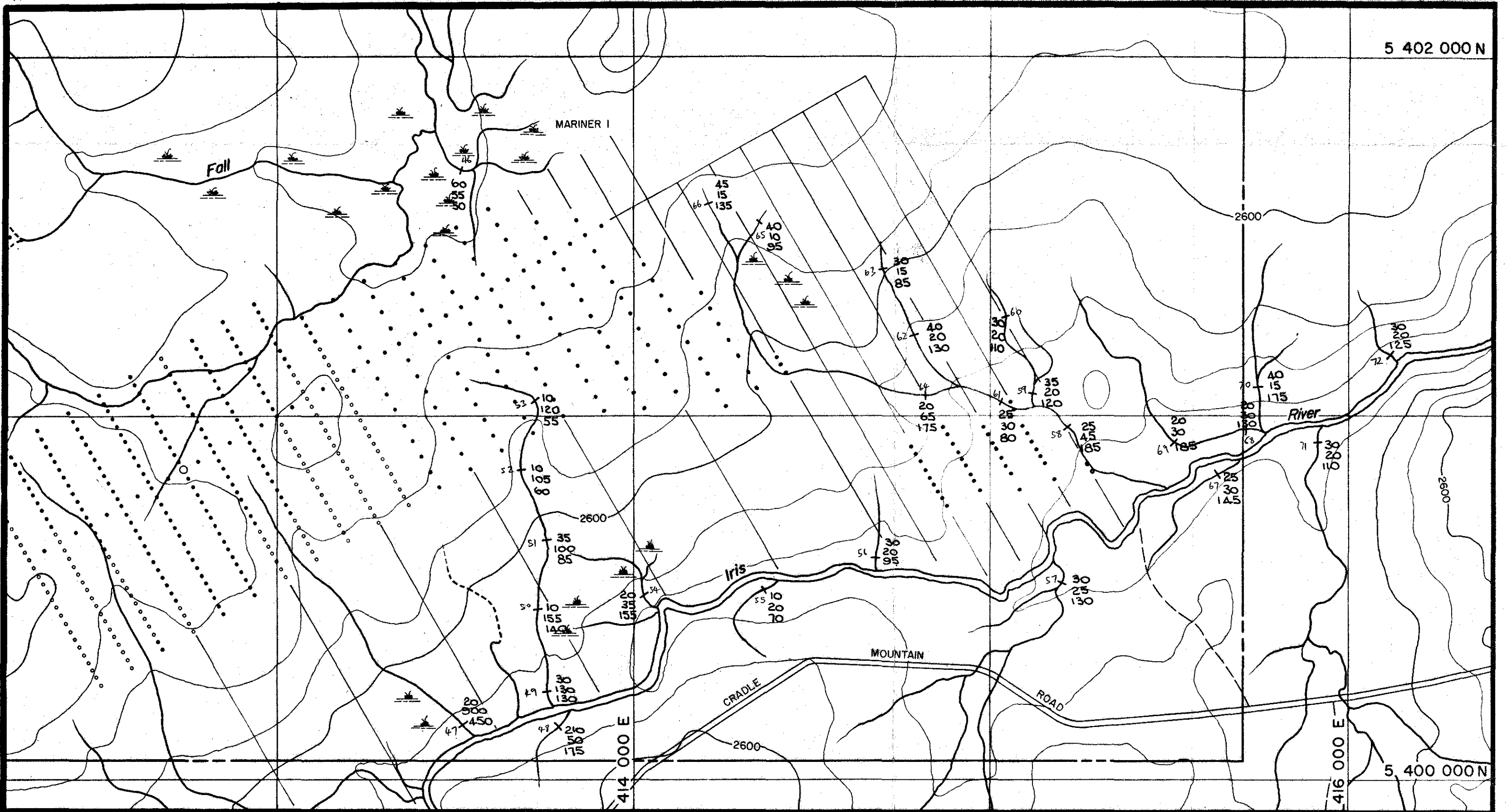
FIG. 4

KT10/74-1	
KT10/74-2	KT10/74-3

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5 402 000 N

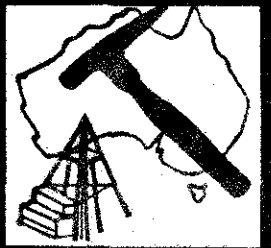
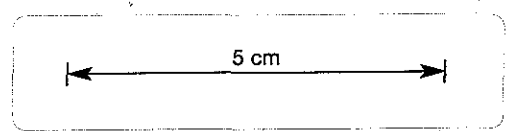


5 400 000 N

LEGEND:

X Cu - ppm
 — Pb - ppm
 • Zn - ppm

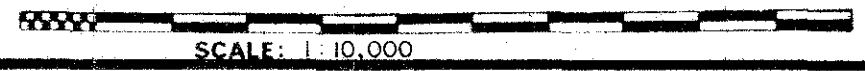
Worms: Cu > 25
 Pb > 120
 Zn > 250



DATE: NOV. 1980
 GEOLOGIST R.R.L.
 DRAWN: D. GREEN.
 CHECKED:

GEOPEKO LIMITED
 Devonport Base, Tasmania

003025



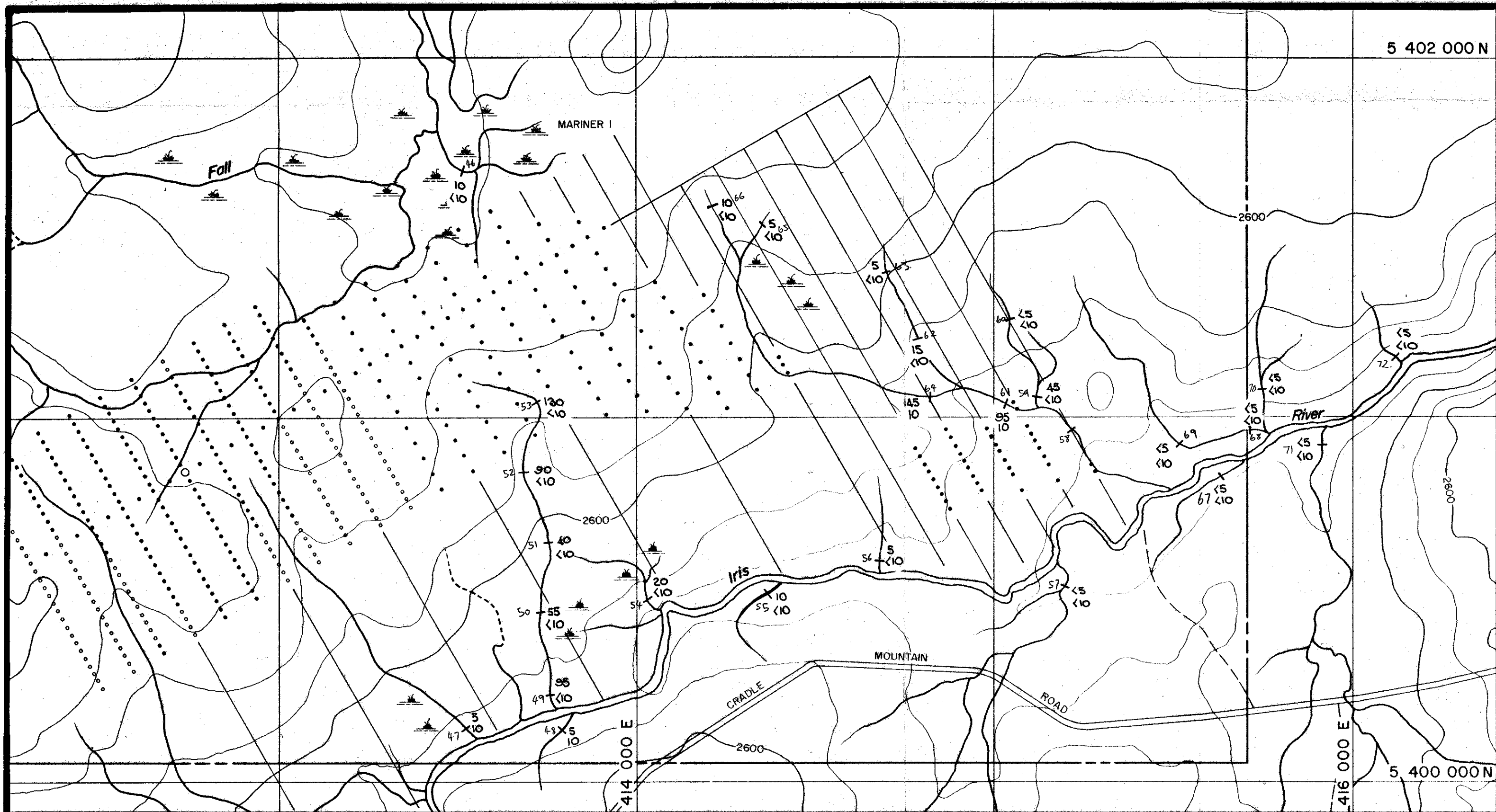
No. TS 10/74-3

FIG. 5

E.L. 10/74
BLACK BLUFF, TASMANIA
MARINER 3 - Drainage Geochemical Results
 Cu, Pb, Zn : -80mesh fraction

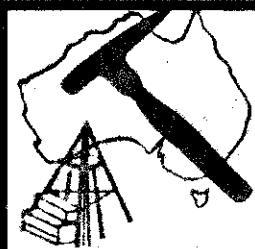
KT10/74-1	
KT10/74-2	KT10/74-3

1161



LEGEND:

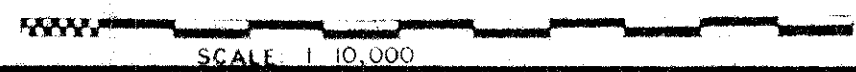
X Sn - ppm
 W - ppm



DATE Nov. 1980
 GEOLOGIST R.R.L.
 DRAWN D. GREEN
 CHECKED

GEOPEKO LIMITED
 Devonport Base, Tasmania.

003026



No. TS 10/74-3

E.L. 10/74
 BLACK BLUFF, TASMANIA
 MARINER 3 - Drainage Geochem.
 Results
 Sn, W : -80 mesh fraction

Fig. 6

KT10/74 1	
KT10/74 2	KT10/74 3

1162

11 900 E

200 1000

11 800 E

1000 1000

1000 1000 1000 1000 1000

1000

11 700 E

1000 1000 1000 1000 1000 1000 1000 1000

1000 1000 1000 1000 1000 1000 1000 1000

11 600 E

1000 1000 1000 1000 1000 1000 1000 1000

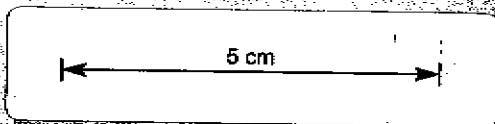
1000 1000 1000

EDGE OF BASALT

11 500 E

1000 1000 1000 1000 1000 1000 1000 1000

1000



9100 N

9000 N

8900 N

8800 N

003027

LEGEND: B-HORIZON SOIL C-HORIZON SOIL

1000 1000 1000 } ppm
 1000 1000 1000 }
 1000 1000 1000 }
 Sample Location

DATE: NOV '80
 GEOL: W.H.
 DWN: D.B.
 CHKD:

GEOPEKO LIMITED
 DEVONPORT, TASMANIA
 Scale: 1:2500
 No. FIG. 7
 MARINE 8 - "WINDON"
 Cu, Pb, Zn, SOIL GEOCHEMICAL RESULTS.

020

11 900 E

11 800 E

11 700 E

11 600 E

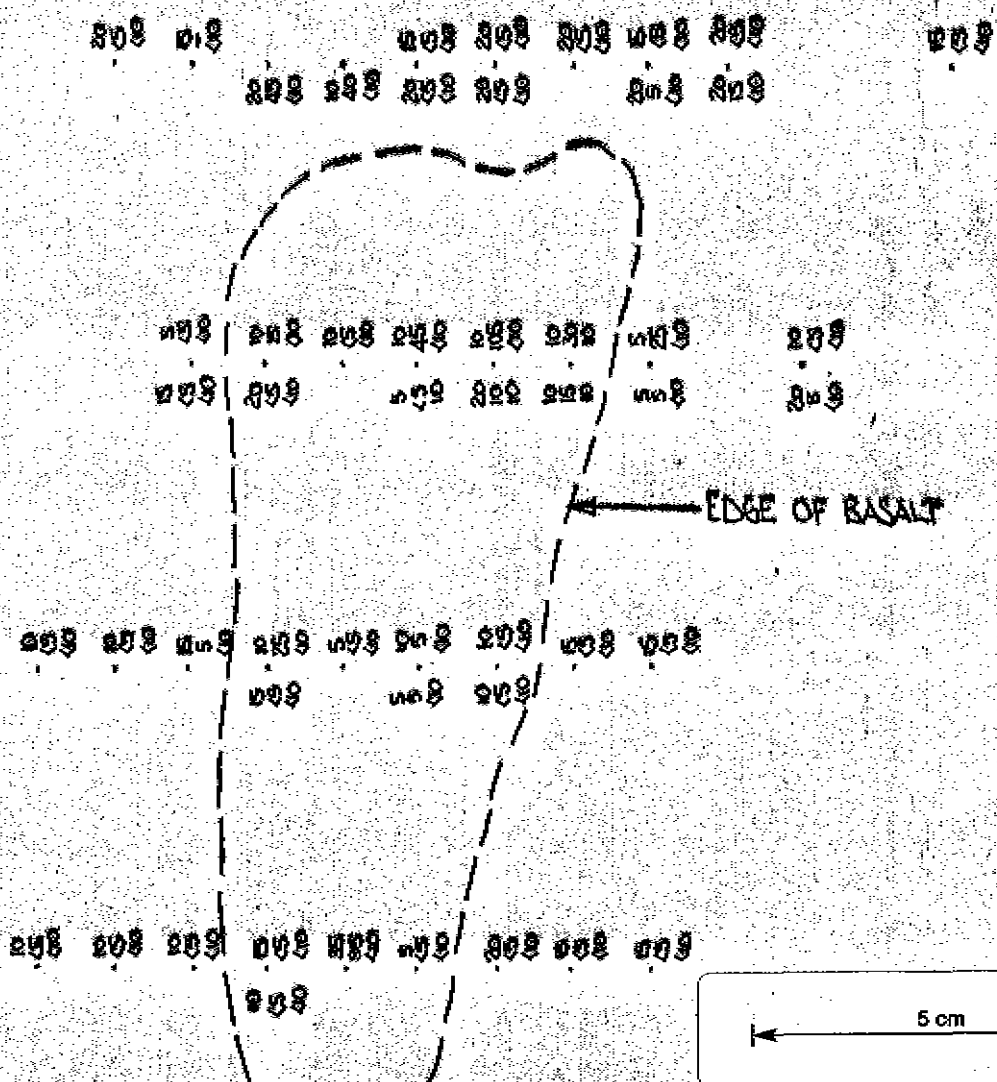
11 500 E

9100 S

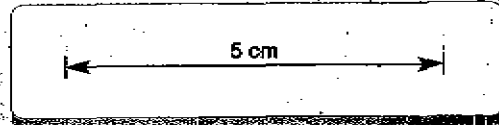
9000 S

8900 S

8800 S



EDGE OF BASALT



003028

LEGEND:

- B. Horizon
-
-
-
-

B. Horizon

C. Horizon

15
45
210

$\frac{15}{45}$ } Bi
 $\frac{210}{45}$ } Sn } ppm.

Sample locations.



DATE: 10/1/69
 GEOL: W.H.
 DWN: D.G.
 CHKD:

GEOPEKO LIMITED
 DEVONPORT

Scale: 1:2500

No Fig. 8

MARINE & "KIMCO" }
 Bi, Sn, W. } Soil Geochemical
 Results.

